Remarks

Claims 1-20 are pending in the application. Claims 1, 5, 7-10, 19 and 20 have been rejected under 35 U.S.C. § 102(b). Claim 6 has been rejected under 35 U.S.C. § 103(a). In view of the following remarks, reconsideration and withdrawal of these grounds of rejection is requested.

Drawings

The Examiner objects to Figures 2(a), 2(b) and 2(c) for failing to show descriptive legends. Revised version of Figures 2(a), 2(b) and 2(c) are submitted herewith which show descriptive legends. Hence, reconsideration and withdrawal of this objection is respectfully requested.

Claim Rejections Under 35 U.S.C. § 102

Claims 1, 5, 7-10, 19 and 20 stand rejected under 35 U.S.C. § 102(b) as being anticipated by one of Rittenbach (U.S. Pat. No. 4,219,812) or Rittenbach (U.S. Pat. No. 4,430,655) (hereinafter collectively "Rittenbach"). For the reasons set forth below, reconsideration and withdrawal of this ground of rejection is respectfully requested.

The present invention comprises, in one exemplary embodiment, a High Resolution Radar (HRR) system 100 (See Fig. 1(a)). The HRR system 100 includes a modulator driver 102 which feeds a transmit channel including modulator 108, and antennae 114 and 126, and a receive channel including modulator 122 and antenna 138.

In the exemplary embodiment shown in Fig. 1(a), one of the antennae in the transmit channel (e.g., antenna 126) includes a phase shifter 124 upstream thereof to introduce a phase shift into the signal transmitted from that antenna. In this manner, the phase shifter 124 serves to create at least two separate transmitted signals at the antennae 114, 126, one comprising a 'reference' signal (e.g., at antenna 114) and one comprising an 'error' signal (e.g., at antenna 126). The 'reference' and 'error' signals preferably comprise identical signals, one being out of phase with the other (e.g., by 180°).

Independent claim 1 now recites:

> A sensor system for detecting an object comprising: a signal source for generating source signal; an antenna system for transmitting said source signal to and receiving a reflected signal from said object; wherein said antenna system is configured for introducing a phase shift into said source signal to create a plurality of transmitted signal patterns; and an information processor programmed to receive said reflected signal and to determine bearing information for said object based on position and phase information in said plurality of transmitted signal patterns.

Thus, claim 1 now requires a sensor system including a "antenna system" configured to introduce a "phase shift" into a source (i.e., transmitted) signal to create a "plurality of transmitted signal patterns." As explained below, Rittenbach fails to disclose, teach or suggest such an invention.

Rittenbach teaches a radar system with a dual-beam antenna 10. The antenna 10 switches between beams under the control of a switch 11 which is driven by a code generator 12. An input pulse train to the switch 11 is combined with a phase modulated version of the input pulse train to form a coded output waveform (see, col. 3, lines 30-45 of '655). The coded output

waveform is alternately provided on the left and right beams of the antenna 10 under the control of the switch 11.

Rittenbach discloses absolutely no means for introducing a "phase shift" into the signal transmitted from the antenna 10 so as to create a "plurality of transmitted signals," as recited in claim 1. As can be seen in Figure 2 of Rittenbach ('655), the signals provided from the left and right beams of the antenna 10 are completely different signals generated without any phase shifting (emphasis added). Particularly, signal C on the right beam of the antenna 10 is not a phase-shifted version of the signal D provided on the left beam of the antenna.

Alternatively to what is argued by the Examiner, the phase modulator 28 disclosed by Rittenbach does not introduce a "phase shift" into a signal transmitted by the antenna 10. The phase modulator 28 merely modulates a code (generated by code generator 12) onto a carrier wave so that the code may be transmitted. As is well know to those of ordinary skill in the art, 'phase modulation' is merely one type of modulation used to transmit digital signals over the air (i.e., there is also amplitude modulation (AM), frequency modulation (FM), etc.). As is also well known to those of ordinary skill, phase modulation does not necessarily involve the introduction of a "phase shift" to the signal modulated. Thus, it is clear that the phase modulator 29 disclosed by Rittenbach does not introduce a "phase shift" into a source signal to create a "plurality of transmitted signal patterns," as required by claim 1.

In sum, Rittenbach fails to disclose, teach or suggest an "antenna system" configured to introduce a "phase shift" into a source (i.e., transmitted) signal to create a "plurality of transmitted signal patterns." Accordingly, reconsideration and withdrawal of this ground of

rejection with respect to claims 1, 5, and 7-10 is respectfully requested.

Independent claim 19 recites:

> A method for calculating bearing information for an object, the method comprising the steps of: receiving a signal reflected from said object, wherein said signal has a reference signal pattern and an error signal pattern produced by introducing a predetermined phase shift into a portion of said signal; determining a reference amplitude and phase and an error amplitude and phase from said signal; determining a phase difference between said reference phase and said error phase, said phase difference having a sign of positive or negative, or a phase difference of zero; calculating said bearing information using said reference amplitude, said error amplitude, and said sign of said channel phase difference.

Thus, as with claim 1 discussed above, claim 19 requires a method of calculating bearing information for an object whereby a "predetermined phase shift" is introduced into a transmitted radar "signal" so that a signal reflected off an object includes a "reference signal" portion and an "error signal" portion which are phase-shifted versions of the "signal." As asserted above, Rittenbach fails to disclose, teach or suggest a sensor system which introduces a phase shift into a transmitted signal to create 'reference' and 'error' signal patterns. Therefore, for at least those reasons discussed above with reference to claim 1, reconsideration and withdrawal of this ground of rejection with reference to claims 19 and 20 is respectfully requested.

Claim Rejections Under 35 U.S.C. § 103

Claim 6 stands rejected under 35 U.S.C. § 103(a) as being obvious over Rittenbach in view of Lewis et al. (U.S. Pat. No. 4,006,478). For the reasons set forth below, reconsideration and withdrawal of this ground of rejection is respectfully requested.

As discussed above, Rittenbach fails to disclose, teach or suggest an "antenna system" configured to introduce a "phase shift" into a source (i.e., transmitted) signal to create a "plurality of transmitted signal patterns." Lewis also fails to disclose, teach or suggest such an invention.

Lewis teaches a signal jamming device which includes, in one exemplary embodiment, band pass filters 73, 74 (See Fig. 10). Lewis does not disclose, teach or suggest an "antenna system" configured to introduce a "phase shift" into a source (i.e., transmitted) signal to create a "plurality of transmitted signal patterns." Therefore, reconsideration and withdrawal of this ground of rejection is respectfully requested, for at least those reasons highlighted above with reference to independent claim 1, upon which this claim depends.

Conclusion

In view of the foregoing remarks, Applicants submit that this application is in condition for allowance at an early date, which action is earnestly solicited.

Respectfully submitted,

Paul A. Taufer
Reg. No. 35,703
Darius C. Gambino
Reg. No. 41,472

Piper Rudnick LLP
One Liberty Place
1650 Market Street, Suite 4900
Philadelphia, PA. 19103
Phone: 215.656.3303

In the Drawings

Applicant submits herewith a revised versions of Figures 2(a), 2(b) and 2(c).

Consideration and approval of the drawing changes to these figures is respectfully requested.

ANNOTATED SHEET

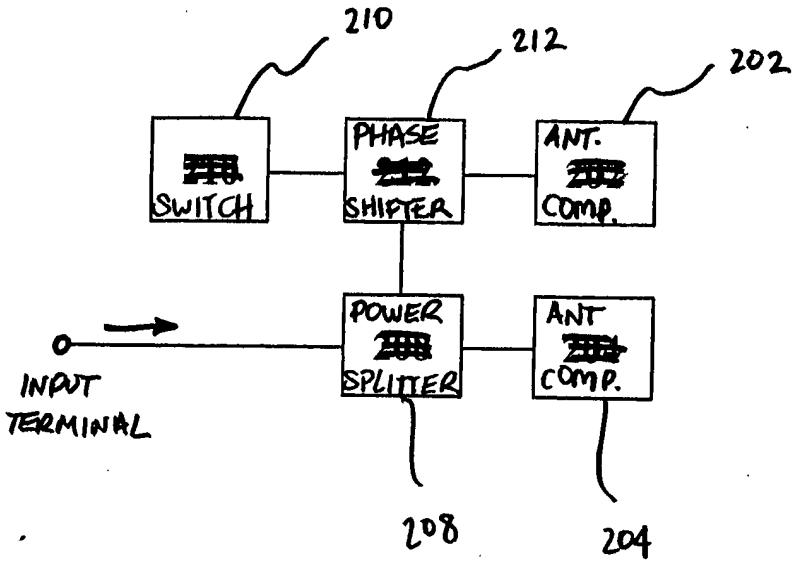

Figure 2(a)

ANNOTATED SHEET

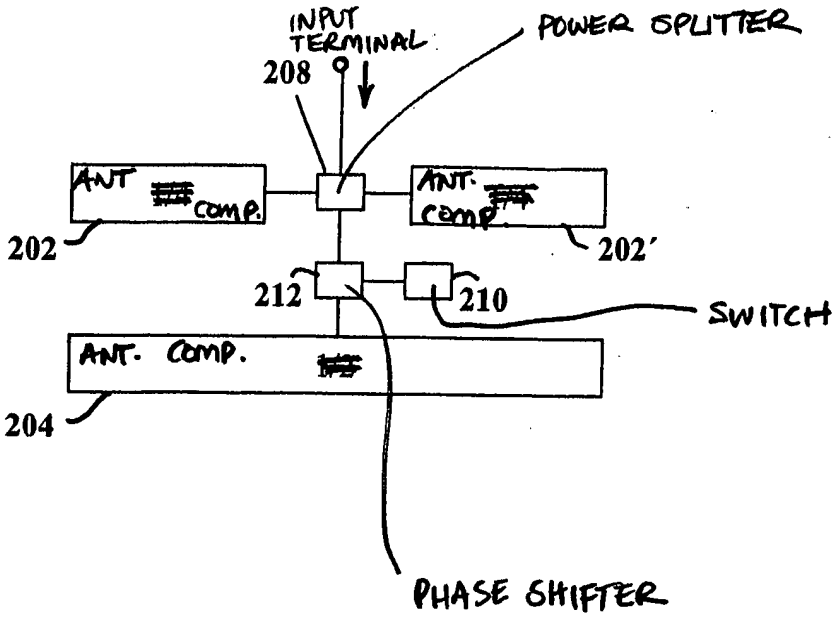

Figure 2(b)

MAKE 208, 210, 212 BOXES BIGGER

ANNOTATED SHEET

APPARATUS, METHOD AND ARTICLES OF MANUFACTURE FOR SEQUENTIAL LOBING HIGH RESOLUTION RADAR
Inventor: Hermann Henftling et al.
EMC: EL985810385US
Sheet 5 of 9 Docket No.: 18100

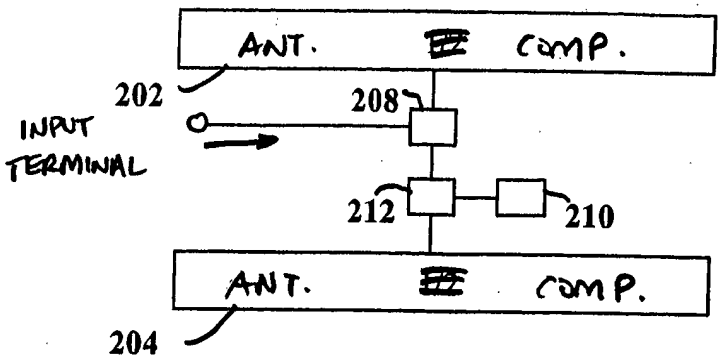

Figure 2(c)

SAME CHANGES AS FIG. 2(b) FOR 208, 210, 212